636
Ed 4
1925/26
Cop. 2

REMOTE STORAGE

THE LIBRARY OF THE
JAN 5 1927
UNIVERSITY OF ILLINOIS

Animal Breeding Research Department

THE UNIVERSITY, EDINBURGH

REPORT OF THE DIRECTOR

For the Year April 1st. 1925 to March 31st. 1926.
(being the 6th Annual Report.)

THE LIBRARY OF
JAN 5 1927
UNIVERSITY OF ILLINOIS

636
Ed4
1925/26
cop.2

EDINBURGH UNIVERSITY AND THE EAST OF SCOTLAND COLLEGE OF AGRICULTURE

JOINT COMMITTEE ON RESEARCH IN ANIMAL BREEDING.

Professor J. Lorrain Smith, M.A., M.D., LL.D., F.R.S.,
Chairman.
Professor E. Shearer, M.A., B.Sc.,
Secretary and Treasurer.

Members of Committee.

H. Armour, Esq.
Professor J. H. Ashworth, D.Sc., F.R.S.
Sir Henry Ballantyne.
Professor Sir Thomas Hudson Beare, B.A., B.Sc., D.L., M.Inst.C.E., F.R.S.E.
Principal O. Charnock Bradley, M.D., D.Sc., F.R.S.E.
Professor A. R. Cushny, M.D., LL.D., F.R.S.
Thomas Elder, Esq.
John Elliot, Esq.
Professor J. Cossar Ewart, F.R.S.
Alex. McCallum, Esq., M.A., LL.B.
J. R. C. Smith, Esq.
J. P. Ross Taylor, Esq.
Emeritus Professor R. Wallace, LL.D., F.R.S.E.
Professor J. A. Scott Watson, B.Sc., F.R.S.E.
William Young, Esq.

Director of the Animal Breeding Research Department,
F. A. E. Crew, Esq., M.D., D.Sc., Ph.D., F.R.S.E.

(During the course of the year the Committee lost the services of two of its most valued members. Professor Cushny's sudden and unexpected death robbed the Committee of his most sincere and sympathetic interest in the affairs of the Department. Professor Scott Watson left Edinburgh for Oxford).

v.6, 1925/26 cont inc
by 27 Aug

INTRODUCTION

THE institution at Edinburgh of an organisation for research into problems of animal breeding was first considered in 1913 by the Development Commission in conjunction with the Board of Agriculture for Scotland. In June of that year there was formed a Joint Committee representative of the University and the College and certain decisions were made regarding the kind of organisation which was to be developed. The outbreak of war interrupted the work of the Joint Committee and it was not until late in 1919 that it could be resumed.

Owing to the unsettled conditions then prevailing, the Committee with the consent of the Development Commission and the Board of Agriculture decided to begin operations on a relatively small scale and to extend them as facilities for so doing presented themselves. Accommodation at the High School Yards, provided by the University, was occupied in February 1921. In December 1924 the Department moved into new and more suitable quarters, again provided by the University, at King's Buildings.

The work of the Department consists in the investigation of those problems of animal husbandry which are concerned with the physiology of reproduction and heredity. A certain amount of breeding work with the smaller quickly-maturing animals is carried out in the Department itself, but, in addition, advantage is taken of the experimental breeding which every stockbreeder is constantly carrying out in the ordinary course of his practice. The part that the institution can play in agricultural progress depends upon two factors, the working strength of its staff, and the amount of support received from the stockbreeders of the country. The problems of animal breeding are so intricate that no one man can bring to their solution all the highly specialised knowledge necessary: a research team is needed composed of specialists in the various branches of science related to breeding.

But the problems which have baffled experienced stockbreeders for generations will not be solved by a team of laboratory-trained workers alone. For their solution the heartiest and most sympathetic cooperation of scientist and breeder is demanded. The Committee looks to the agricultural community for support. Information concerning the work of the Department will be given gladly at all times on application to Dr. Crew. Reprints of published papers will be sent to any

person interested. Accommodation will be provided, as far as possible, for duly qualified workers who wish to undertake a piece of approved re-:search. It is particularly requested that breeders will inform mem-:bers of the staff of unusual occurrences in their breeding operations, and that any specimen exhibiting an abnormality, especially of the re-:productive system, may be sent to the Department for examination and report.

Up to the present the expenses of the Committee have been met from grants made by the Development Commission, the Board of Agriculture for Scotland, and the University Court. Under Treasury instructions, the grants from Government Departments are in future to be dependent on a proportion of the funds being obtained from other sources. The Joint Committee therefore appeal for subscriptions and donations towards the formation of an endowment fund.

For the Joint Committee,

J. Lorrain Smith,
Chairman.

E. Shearer,
Secretary.

Postal Address : Animal Breeding Research Department, the University,
King's Buildings, West Mains Road,
Edinburgh.

Telephone No. : Central 8567.

SIXTH ANNUAL REPORT.

THE Spencerian conception of the conflict between Individuation and Genesis finds an apt illustration in the affairs of this Department during the year under review. It is taught that energy expended in growth is not available for the process of creation. The transfer of the Department to King's Buildings in December 1924 provided room for considerable expansion, and since that time we have been mainly concerned in the exploitation of this increased accommodation for our-:selves and for our animals and in growing to the limits of the space allotted to us. Of necessity, therefore, we have not produced as much in the way of original research as we should have liked. We have been mainly concerned, and for a further period must continue to be so em-:ployed, with the building of secure foundations for the department that is yet to be, commonly being forced by circumstances to make our bricks without the straw of adequate financial endowment.

It is most desirable that the Department should launch upon ambi-:tious breeding experiments full of promise of economically valuable results with animals esteemed by the breeder of farm stock. Nothing would please us more than to do this straightway, but to do so would be unjustifiable until we have the assurance that such an experiment could be conducted on a sufficiently large scale and be followed to its complete conclusion. We have no such assurance at the present time. However, we are preparing for such experimentation. The seven acres of land placed at our disposal by the University have been cut up into small paddocks and put down into permanent pasture. Open sheds, food stores, a large goat-house, and some twenty poultry houses and runs have been constructed.

It is recognised clearly that no matter how much more land we may obtain at King's Buildings, it will never be possible to maintain there-upon that number of the larger animals which is necessary for sound genetical experimentation, and it is planned, therefore, to use this land only for such investigation as can be carried out with small num-:bers of animals which demand the constant personal attention of the investigator. The type of investigation which requires large numbers and needs but infrequent inspection will be conducted (1) on a depart-:mental farm, if and when such becomes available; (2) on the farm of the College of Agriculture; and (3) on the farms of private breeders and with their collaboration. This arrangement has proved to be quite satisfactory and profitable, and in our relations with College author-:ities and private breeders we have been exceedingly fortunate as will

be gathered from the pages of this report. The result of this is that we have been able to carry out quite extensive experimentation with a minimum of expense and at the same time to secure from the private breeder his sympathetic understanding of the functions of this De-:partment. It is most desirable that experimentation shall not be obscured in any way by any consideration of immediate financial profit or loss. Financial stringency will always prevent us from carrying out really expensive experimentation ourselves, and we have no desire, even though we had the ability, to organise the Department so that it would show a financial profit which could be used to meet the cost. We would rather seek the collaboration of the private breeder, asking him to allow us to make observation upon his flocks and herds, for it has been found that this can be done without much, or, in certain cases, without any interference with routine farming procedure. There is no doubt, however, that shortly the need for an experimental farm will be-:come acute.

Our experience in the past has enabled us to anticipate that the usefulness of the Department to the agricultural community will largely take the form of placing precise values upon recognised breeding pract-:ices. Much that the breeder already values has received and will receive the endorsement of science; much that is at present held to be financially profitable will surely be ruthlessly condemned on biologic-:al grounds. Evidence is accumulating that shows beyond all question that in certain instances the breeder is seeking to fix the genetically unstable, to perpetuate the biologically unworthy; standards that are physiologically false will not long withstand the continued and grow-:ing demand that worthiness shall be estimated in terms of actual func-:tioning, of the power to perform.

Even thus far we have been urged to undertake such a variety of tasks that it is desirable to state that in our opinion the breeder must recognise quite clearly that all of his problems do not and can-:not attract one and the same investigator. Before the latter can be expected to produce results of economic importance two things at least are requisite: the problem must be amenable to investigation by those methods of enquiry that are the peculiar possession of the investigat-:or; secondly, and more important, the problem must attract the part-:icular man who is to undertake its solution. Truth discloses herself most readily to such as seek her impelled by a most violent curiosity. Routine research will undoubtedly secure data of importance and value but it does not always see in them finger-posts to discovery. The breeder should take steps to arouse the interest of the scientist in his varied problems in the hope that amongst them there may be one that will attract him irresistibly. The suggestion that if such and such problems were solved vast sums of money would be saved may be of pro-:found economic interest to the economist and the statesman: it will certainly interest the scientist as a citizen but it does not constit-:ute the kind of stimulus that provokes him to ardent investigation.

The problem must stimulate his scientific curiosity before he can de-:vote himself utterly to its solution.

The Department has been engaged for a considerable period in the study of sheep breeding problems, particularly in connection with the fleece. The experience gained has allowed us to see quite clearly that the first essential is a study of the material so that fleece qual-:ities can be strictly defined in scientific terms. Until this is done, it is impossible to carry out work that is likely to possess a permanent value or that is capable of universal application. The fleece of the sheep occupies a special place amongst agricultural products in that in this country it is definitely a by-product which is yet sold directly by the farmer. For this reason, it is very natural that the clear realisation of practical values that is characteristic of other animal products should not be so well defined in the case of the fleece. The fleece is of value to the breeder not only on account of its direct money value or quantity which in turn depends both on quantity and quality, but also on account of any relations that may exist between the nature of the fleece and mutton qualities, the suitability of the sheep for its environment, and those special breed characters that may be termed points of fashion. The fleece then affords a specially fav-:ourable field for scientific work, especially if these other factors are also considered in any scheme. The co-operation of the private breeder is no less essential than is that of the manufacturing expert. Ample room for investigation exists in many breeds without any necess-:ity for crossing outside the breed. Breed characters having been defined, it becomes possible to discover the variations that exist and to take advantage of this to lay down standards within a breed. Fol-:lowing this, hybridisation may be found of value in some cases.

It is necessary to maintain a certain number of sheep at the De-:partment in order to provide material for investigations that require the constant personal observation of the investigator, but the great bulk of the work can be done on the flocks of institutions or of pri-:vate breeders who are willing to co-operate and that without material-:ly disturbing the normal management of the flocks.

We wish to acknowledge our indebtedness to the Carnegie Trustees for an annual grant of £200 for a period of five years. It is in-:tended to use this money for equipping a biochemical laboratory. Much of our work has up to now been embarrassed by the fact that we have had no means for conducting biochemical investigation. There is many a problem which cannot be solved by purely genetical methods of analysis; it is not enough to disclose the factor which corresponds to a certain hereditary character: it is highly desirable that know-:ledge should be gained concerning the manner in which the factor in its action actually determines the character, and this in many cases is a problem in biochemistry. This grant will enable us to make our analysis far more thorough.

GIFTS.

We wish to express our gratitude to those who during the year have given to the Department material help.

Equipment.

1 "Invincible Ironclad" Incubator.....	Mr. C. A. Sydenham Hannaford, Hamworthy Junc-/:tion, Dorset.
1 Fleuss Pump	Osram-C.E.C. Lamp Works, Brook Green, Hammer-/:smith, London, W.6.

Fowls, Abnormal Specimens.

1 White Wyandotte	Mr. R. Forman, Burnhead, Bridge of Cally, Blairgowrie.
1 Sicilian Flowerbird ...	Mrs. E. Gardiner, Bredon House, Selwyn Gar-:dens, Cambridge.
1 White Leghorn	Miss Grantham, Barcombe Place, near Lewes.
1 White Leghorn	Mr. R. M. Hislop, Windybraes, Linlithgow.
1 White Leghorn	Mr. P. A. Howden, Woodcorner Farm, South Heath, Nr. Great Missenden, Bucks.
1 White Leghorn	Dr. T. Macdonald, Netherdale, Beauly, Inver-/:ness-shire.
1 Leghorn x Wyandotte ...	Mr. E. Leslie Pattison, Weston Coyney Hall, /Longton.
1 White Leghorn	Miss Frances Pitt, The Albynes, Bridgnorth.
1 Brown Leghorn	Mr. L. H. Smales, Arundel Howe, Low Stakesby, /Whitby, Yorks.
1 Rhode Island Red	Mr. T. B. Timmins, Easter Balbarton, Kirk-/:caldy.

Ducks.

1 Pair Magpies	Mr. H. W. Andreae, Hilltop Poultry Farm, /Harston.
1 " Khaki Campbells ..	Mr. O. C. Brown, Appleby, Scunthorpe, Lincs.
1 " White Runners.....	Messrs. W. H. Cook, Ltd., Poultry Farm, Kent.
1 " Penguins	Mr. G. Scott, Peerless Poultry Farm, Mirfield.
1 abnormal specimen	Miss Hardy, Feltwell Lodge, Feltwell, Norfolk.

Canaries.

1 abnormal specimen	Mr. J. G. Nicholson, Bangholm Ter., Edinburgh.

Dogs.

1 Eyeless Fox-terrier ...	Mr. R. MacGregor, M.R.C.V.S., Market Har-/:borough.

Goats.

1 Ang. Nub. ♀	Mrs. A. Castleman, The Plough, Byfleet, Weybridge.
1 Ang. Nub. ♂	Mrs. Macdonald, Garrochty, Kingarth, Isle of Bute.
1 Ang. Nub. ♀	Mrs. Macdonald, Garrochty, Kingarth, Isle of Bute.
1 Ang. Nub. ♀	Mrs. R. Pease, Sledwich, Barnard Castle, Durham.
2 A. N. Swiss ♀	Mrs. K. Elsdale, Sar Lodge, Beaminster, Dorset.
2 A. N. Swiss ♀	Miss V. Phillips, The Cottage, Battlesbridge, Es-/:sex.
1 A. N. Swiss ♀	Miss M. Steward, Hill Gay, Down Road, Portishead.
1 A. N. Togg. ♂	The Hon. A. Douglas Pennant, Windleshaw, Withyham.
1 A. N. Togg. ♀	Mrs. F. A. Konig, Tyringham House, Newport Pagnell.
1 A. N. Togg. ♀	Mrs. G. Tredgold, Nesteta Poultry Farm, Cuffley.
1 A. Swiss ♀	Lady Forteviot, Dupplin Castle, Perth, Perthshire.
1 A. Swiss abnormal	Lady Forteviot, Dupplin Castle, Perth, Perthshire.
2 A. Swiss ♀	Mrs. G. E. Hamilton, Stratton St. Margarets, Wilts.
1 A. Swiss ♂	Capt. G. C. Heseltine, Woodside, Ropley, Winchester.
1 A. Swiss ♀	Lady Pelly, Broome House, West Horsley, Surrey.
1 A. Swiss ♀	Mrs. C. Poore, The Livery, Winterslow, Salisbury.
4 A. Swiss ♀	Mr. C.M. Selby, Holbury, Four Marks, Alton, Hants.
1 Brit. Alp. ♀	Miss A. Anglionby, Newbold Pacey Vicarage, Warwick.
1 Brit. Alp. ♀	Miss E. M. Gresley Hall, Chafford House, Forcombe.
1 Brit. Alp. ♀	Capt. G C. Heseltine, Woodside, Ropley, Winchester.
2 Brit. Alp. ♀	Mrs. Macdonald, Garrochty, Kingarth, Isle of Bute.
1 Brit. Alp. ♀	Miss E. I. Prideaux, Crosslands, Flitwick, Beds.
1 Brit. Alp. ♀	Lady Margaret Proby, Elton Hall, Peterborough.
1 Brit. Alp. ♀	Mr. J. Richmond, Church View, Bingham, Nottingham.
1 Brit. Alp. ♀	Mr. R. Vaughan, Garthmaelan, Dolgelley, N. Wales.
1 Saanen abnormal.	Miss M. Hathaway, The Cottage, Bicknoller, Taunton.
1 Saanen ♀	Mrs. Maurice, Buckhurst Farm, Markbeech, Edenbridge.
1 Saanen abnormal.	Mrs. I. Morcom, The Clock House. Bromsgrove.
1 Togg. ♀	Miss E. M. Bird, Saltburn House, Earthorpe, Bedale.
1 Non-pedigreed ♀	Mrs. Arthur, Old Mill House, Sawston, Cambridge.
1 Non-pedigreed ♀	Miss D. E. Burrows, Holmwood Farm, Hordle, Hants.
1 Non-pedigreed ♀	Mr. L. C. Crane, 207, Bury New Road, Manchester.
2 Non-pedigreed ♀	Miss E. M. Gresley Hall, Chafford House, Forcombe.
1 Non-pedigreed ♀	Mrs. L. Hines, Watley, Twyford, Winchester.
4 Non-pedigreed ♀	Mrs. Helen Laws, Car Colston, Nottingham.
2 Non-pedigreed ♀	Mrs. Macdonald, Garrochty, Kingarth, Isle of Bute.
1 Non-pedigreed ♀	Miss M. M. Neame, Invicta Poultry Farm, Storring-/:ton, Sussex.
1 Non-pedigreed ♂	Lady Wilson, Pencraig Court, Ross-on-Wye.

Sheep.

1	5-legged lamb	Mr. D. Hay, Lawton House, Arbroath.
1	Persian ram	South African Government.
1	Persian ewe	
1	Merino ram lamb	
1	Persian x Merino ewe lamb	

Pigs.

1 Pedigreed Large Black boar ... Mr. L. MacQueen Douglas, Newpark, /West Calder.

STAFF.

Mr. A.D. Buchanan Smith, M.A., M.Sc., was appointed as assistant. It is intended that he shall serve as a liaison officer between the Department and the agricultural community of Scotland.

RESEARCH STUDENTS.

The following research students working in the Department graduat-:ed Ph.D. Edinburgh during the year :-

Miss J.S.S. Blyth, B.Sc., Scotland.
Mr. A.W. Greenwood, M.Sc., Australia.
Mr. F. W. Sansome, B.Sc., Scotland.

The following are continuing their studies and will proceed to graduation next year :-

Dr. T. Marchlewski, Poland. (Holder of a Rockefeller scholarship).
Mr. J. E. Nichols, M.Sc., England.
Mr. J.A. Fraser Roberts, M.A., B.Sc., /Wales.
Mr. Y. Tamura, B.Sc., Japan.

The following have been recognised by the University as research students, and are working in the Department under the supervision of Dr. Crew.

Mr. A. Calder, B.Sc., Scotland. (Holder of a Board of Agriculture scholarship).
Mr. A. Chaudhuri, B.Sc., India.
Mr. J. Hashimoto, B.Sc., Japan.
Mr. P. Mac Isaac, B.Sc., India.
Mr. Ram Singh Sarkaria, M.Sc., India.

During the year Professor I. Amemiya, Japan, and Capt. E. J. Mul-:ligan, Kenya Colony, received scientific hospitality in the Department.

There are plentiful indications that the Department will, when completely organised, continually attract a considerable number of overseas graduates in agriculture. The Department is most fortunately situated, for within a short radius around it there are massed un-:equalled facilities for one who wishes to make a survey of breeds and of breeding practices. It is our intention to exploit these advant-:ages to the full in order that we may attract graduates and, having attracted them, provide them with unrestricted opportunity for profit-:able research. This cannot be done without the hearty co-operation of the breeders themselves and our experience allows us to assume that we shall not appeal to them in vain. There is no need to stress the fact that such co-operation as this is definitely profitable to them, for these graduates, returning to their own countries, must of necess-:ity belaud all that they find worthy here.

TEACHING.

Courses of lectures were given as follows :-

1. Edinburgh University - Dr. F. A. E. Crew.

   To students of Veterinary Science.
   " students of Pure Science.
   " 3rd year students of Agriculture.*
   " 1st year students of Agriculture and Forestry.
   " students of the Post-Graduate Medical School.

   *Dr. R. J. D. Graham, Royal Botanic Gardens, Edinburgh, took part in this course, dealing with the subject of genetics in relation to plant-breeding.

2. University College of North Wales, Bangor - Mr. J. A. F. Roberts.

   To students of Agriculture.

3. Armstrong College, Newcastle-on-Tyne - Mr. J. E. Nichols.

   To students of Agriculture.

4. Aberdeen University - Mr. A. D. Buchanan Smith.

   To students of Agriculture.

5. Glasgow - Mr. A. D. Buchanan Smith.

   Joint course to students of the West of Scotland College of Agric-:ulture, and of the Veterinary College.

PUBLIC LECTURES.

Papers were read before the following societies :-

Royal Society of Edinburgh.	Dr. Crew.
British Medical Association, Dundee Branch.	do
Edinburgh University Physiological Society.	do
Edinburgh School of Social Study.	do
Workers Education Association.	do
Edinburgh Dental Students' Society. . . .	do
Lancashire Utility Poultry Society. . . .	do
Scottish Dairy Show.	do
Aberdeen Poultry and Dairy Conference. . .	do
Edinburgh University Philomatic Society. . .	do
University College of Wales Agricultural Society.	do
Scottish National Poultry Council.	do
Harper Adams Agricultural College.	do
Royal Physical Society.	Dr. Crew & Prof. Amemiya.
St. Andrews University Biological Society. .	Dr. Greenwood.
National Farmers' Union, Kelso.	Mr. Nichols.
Garioch Farmers' Club.	Mr. Smith.
Scottish Research Workers' Conference. . . .	Miss Blyth, Mr. Nichols, Mr. Roberts &Mr. Smith.

EXHIBITS.

Exhibits were contributed as follows :-

Royal Agricultural Society Show, Chester.
British Empire Exhibition, Wembley.
Highland & Agricultural Society Show, Glasgow.
Armstrong College Agricultural Exhibition.
Scottish Dairy Show.

PUBLICATIONS DURING THE YEAR AND WORK IN PROGRESS.

J. S. S. BLYTH.

Work in Progress.

Heterogonic Growth. Heterogonic growth (i.e., the accelerated growth of certain parts of the animal body which coincides with, and is dependent on, the springing into action of the gonads), is being studied in the fowl, the size of the comb which exhibits heterogonic growth being compared with the body weight.

Two series of birds have been under observation: (1) a light, early maturing breed, White Leghorn; and (2) a heavy, late maturing breed, Light Sussex. In each case cocks were used, but in addition a pair of hens from each breed and three Leghorn capons were also observed. Measurements were taken weekly and graphs have been plotted for individual birds as a preliminary to the statistical examination of the data when the experiment has been completed.

In the first series the acceleration in the rate of comb growth occurred early and was very great. However, it was of short duration and by the 23rd week it had in all cases become parallel to the body growth rate again. In the second series the acceleration has been much more gradual and appears to be still present although the present increased rate of comb growth may be due partially to the seasonal variation in comb size which is known to occur at certain seasons of the year.

In the hen the heterogonic growth was observable but was less marked than in the cocks of their respective breeds. In the case of the capons the curves for body growth rate and comb growth rate have been parallel throughout.

The Manoilov Reaction for the Identification of the Sexes. The Manoilov test consists of adding a number of reagents to a small quantity of blood; blood from animals of opposite sexes gives a different reaction. A preliminary study of the reaction is being made with the blood of fowls and other available animals with a view to testing its accuracy before using it to test the blood of intersexes, etc.

Southdown x Blackface Experiment. The crop of second cross lambs born in 1925 was much superior both as regards conformation and fleece to the previous crop. All the ewes produced lambs and about half of them had twins. The best ewe lambs together with two tup lambs have been retained for breeding purposes. The nine F_2 gimmers which were put to an F_2 tup lamb in autumn 1924 produced ten lambs, but as none of these were of high standard it was thought best to cast all. Larger

numbers of F_3 lambs will be available for selection this season. The F_1 and F_2 ewes were mated up again in autumn 1925 to the Kingussie tup and an F_2 tup lamb respectively. The crop of lambs is not so promis-:ing as the previous ones. The numbers too are smaller, there being few-:er twins and four F_2 ewes barren.

F. A. E. CREW.

(1) Papers Published.

Animal Genetics: An Introduction to the Science of Animal Breed-:ing. (Oliver & Boyd. 1925).

Genetics in Relation to Livestock Breeding. (Trans. Highl. Agric. Soc., 1925). A concise account of what genetics is, demonstrating the methods employed in genetical analysis and its usefulness to the breeder.

Unilateral Vasoligation on the Senile Male of the Domestic Fowl. (Proc.Roy.Soc.Edin., 1925). Contrary to the results claimed by those who have used the mammal as experimental material, this operation does not lead to rejuvenation in the case of the fowl.

Rejuvenation of the Aged Fowl through Thyroid Medication. (Proc. Roy. Soc. Edin., 1925). The administration of desiccated thyroid to aged fowls of both sexes is followed by definite rejuvenation effects, and the males so treated assume a plumage that is distinctly henny in structure and colouration.

Prenatal Death in the Pig and its Effect upon the Sex-Ratio. (Proc. Roy. Soc. Edin., 1925). An extensive study of pig fœtuses obtained from public abattoirs revealed the fact that, as the result of concep-:tion, about 150 males per 100 females are produced. Throughout the period of pregnancy prenatal mortality occurs and bears more heavily upon the males so that the sex-ratio at the time of birth is equality. The male is less able to withstand the stress of functioning both be-:fore and after birth. Improved husbandry and antenatal care lead to an increase in the relative number of males born.

Sexuality and Intersexuality. (London). A lecture delivered be-:fore the British Society for the Study of Sex Psychology.

with S. A. ASDELL. The Inheritance of Horns in the Goat. (Jour. Genet., 1925). The mode of inheritance of horns in the goat is ident-:ical with that which obtains in the case of cattle. The hornless condition is dominant in relation to the horned. In order to fix horn-:lessness as a herd character the most direct method of procedure is as follows. A hornless sire (naturally hornless and not disbudded) be-:fore being used as the herd sire should be mated with twelve horned

females. If he throws none but hornless offspring he can at once be used in the herd. If he throws any (even one) horned offspring he should be discarded. This procedure should be repeated with every successive sire used.

2. Work in Progress.

(a) The genetic relation of the members of the black-red plumage col-:our series in the fowl.

(b) The cause and significance of certain forms of dead-in-shell and of early death in chickens: lethal factors in the Frizzle and in the Japanese Bantam.

(c) Sex-reversal in the fowl. The sex-ratio among the chickens sired by a bird that previously functioned as a hen.

(d) The relation of thyroid functioning and plumage characterisation in the fowl.

(e) The relation of gonadic functioning and plumage characterisation in the fowl.

(f) Intersexuality in goats, sheep, and cattle.

(g) (In collaboration with Mr. T H. Riches, Kitwells, Shenley, Herts.). The genetic significance of the bulldog calf of the Dexter.

(h) The genetic relation of the Himalayan, Chinchilla, Havana, Dutch, White Beveren, Albino, and English coat colours in the rabbit.

(i) The cause and significance of a peculiar form of hairlessness in the mouse.

(j) The genetical basis of certain peculiar plumage ornamentations in the pigeon.

A. W. GREENWOOD.

1. Papers Published.

Gonad Grafts in the Fowl. (Brit. Jour. Exp. Biol., 1925). (cf. Fifth Annual Report, p. 15).

with F. A. E. Crew. Studies on the Relation of Gonadic Structure to Plumage Characterisation in the Domestic Fowl. I. Henny Feather-:ing in an Ovariotomised Hen with Active Testis Grafts. (Proc.Roy.Soc., 1926). Into a Brown Leghorn hen, ovariotomised when four days old, the

testes of a brother were implanted. The bird first assumed the plum-:age characterisation of the cock, but after a general moult her plum-:age became as that of a hen. Post-mortem examination revealed a small fragment of degenerate ovarian tissue left behind at the time of opera-:tion, an active right gonad of testicular structure, and abundant test-:icular tissue which had developed from the grafts.

The situation is discussed and reasons given for holding the op-:inion that ovarian and testicular tissues in respect of their own in-:dividuation exert demands upon the general economy of the same kind, but different in degree: that the functioning of an ovary is physiol-:logically more expensive than is that of the testes; and that it is possible to augment the demands of the testes until they become equiv-:alent to those of the ovary. Such a metabolic, as opposed to an hormonic, hypothesis as to the rôle of the gonads in sexual differenti-:ation, is in general agreement with the conclusion of Riddle (1925) and the much older one of Thomson and Geddes (1899).

It is suggested that this hen became cocky-feathered because in her body at this time there was active testicular tissue, and that she lat-:er became henny-feathered because the amount of testicular tissue had become greatly increased and had exerted demands upon the body equiv-:alent to those of an active ovary,

(2) Work in Progress.

A Case of Complete Bilateral Stenosis of the Epididymis in the Goat. (In the press). The specimen was taken from an apparently perfect male Anglo-Nubian Swiss goat which was born twin to a herma-:phrodite. The genital glands and associated accessory ducts were ap-:parently normal. When, however, the testes and epididymis on both sides were bisected mediolongitudinally, it was seen that the caput of the epididymis and the structure of parts of the gonadic tissue were distinctly atypical. The tubules of the caput region of the epidid-:ymis on both sides were filled and in some parts relatively enormously distended by masses of inspissated sperm. Histological examination of the testes showed that although the bulk of the tissue was normal, is-:olated areas of tubules packed with mature sperm were found. The spermatic tubules surrounding these areas were found to exhibit varying phases in degeneration of the germinal tissue. The bilateral symmetry of the abnormal condition indicates that it is most probably a devel-:opmental abnormality and not a pathological condition resulting from a parallel infection of the epididymis on both sides of the body. The case is further of some considerable scientific interest in that it supplies additional evidence as to the effect of epididymectomy on the subsequent fate of the reproductive tissue.

Gonad Grafts in the Fowl. A further series of experiments to educe sufficient evidence for verifying the hypotheses put forward in a previous publication.

Embryological Studies on Plumage Development in the Frizzle, Silk-:ie, Hackleless, and the normal chick.

Gland Extracts and Sexual Differentiation in the Fowl. An at-:tempt is being made to modify the processes of sexual differentiation in the developing chick by the injection, at the third day of incuba-:tion, of physiologically active extracts of the various endocrine glands into the air space at the broad end of the shell. The extracts are absorbed through the shell membrane into the circulation of the chick embryo. This method possesses some advantages over the meth-:od of glandular grafts in that (1) the dosage can be controlled; (2) the extract is known to be physiologically active; and (3) in the case of glandular grafts a healthy appearance of the graft may not de-:note normal functional activity of the glandular tissue.

Cytological Studies on the Genus Sitona (Weevil).

with F. A. E. CREW. Studies on the Relation of Gonadic Structure to Plumage Characterisation in the Domestic Fowl. II. The Capon. The second investigation of the series. The material for this study consists of twelve birds. Eight of these are developmental capons, i.e., individuals in whom, owing to a maldevelopment of the reproduct-:ive glands, the typical features of the capon are exhibited. In the other four birds the gonads were removed surgically and subsequently they assumed the typical plumage characterisation of the capon.

J. E. NICHOLS.

(1) Papers Published.

Segregation in Halfbred sheep. (Jour. Hered., 1925). The study of the Border Leicester × Cheviot second generation, when completed, showed that the characters of body conformation and fleece characters were segregated sufficiently to indicate that their inheritance was in accordance with Mendelian theory. Of the first cross 114 selected ewes were used for breeding; they showed considerable variation of fleece characters but none approached closely the parental types. Their off-:spring by halfbred rams were capable of classification by body and fleece standards into well-marked types, it being found that of the total of 186, 34 were typical Border Leicesters; 115 typical 'Halfbred'; 1 a typical Cheviot; and 36 were classed as indefinite. The indefin-:ite class consisted of the various combinations of the three body types with the three fleece types, but 3 sheep very closely approached the typical Cheviot. With regard to general body conformation the con-:clusion was reached that a number of major factors were involved, but their expression was influenced by a considerable number of modifying factors, and such interpretation affords ample accord to the practical establishment of 'purebred' lines of Halfbred sheep with greatly reduc-:ed variation.

(2) Work in Progress.

Fertility and Fecundity in Sheep. The investigation begun in season 1923-1924 has been continued and data collected from a number of purebred flocks of various breeds for season 1924-1925. The measure of fertility was the number of lambs born per hundred ewes lambing and the total number of ewes in the flocks studied was 4054 yielding 5825 lambs. The number of returns was small but it was possible to make certain general conclusions as to the causes of variations in fertility in sheep. Differences in fertility are due to primary hereditary caus-:es influenced to such a degree by various environmental causes that the primary differences may in some cases be obscured. High fertility is associated with a high percentage of multiple births and a low per-:centage of barrenness and abortion, and barrenness may normally be due to causes similar to those which produce a paucity of twins; nutrition of the ewe at the time of service may probably be one of the most im-:portant of these causes. It was found that flushing, irrespect-:ive of the method, resulted in most breeds in fertility greater than that of the total for each breed and that the total fertility of all flushed flocks was greater than the total fertility of all the flocks considered. It is very probable that the high fertility of certain crosses is due to the complementary neutralisation of lethal factors which, as is supported by evidence, exist in some breeds.

The returns of data from the Southdown breed were sufficient to warrant separate statistical treatment, records of 26 flocks containing an average of 194.6 ewes which lambed being available. The average yield of lambs per hundred ewes for season 1924-1925 was 119.3; it was found that those factors, environmental or otherwise, which caused bar-:renness and abortion had little or no effect on the percentages of multiple births, and that while barrenness and abortion may be due to a certain extent to the same causes, it is those factors which cause abortion that affect fertility, by reducing the number of single births rather than the number of multiple births. The effect of flushing in this breed was not generally significant. In the case of shearling Southdown ewes a different condition exists in that there is a close correlation between barrenness and abortion and barrenness is assoc-:iated with a decrease in the percentage of twins born; barrenness is the chief cause of infertility in shearling Southdown ewes and is due chiefly to prefertilisation causes producing reduced or delayed ovula-:tion.

This type of investigation must prove of great value to the sheep breeder and the Southdown Sheep Society have undertaken the collection of further data so that the work may continue to greater significance.

Studies in the Fleece of the Suffolk Sheep. A preliminary invest-:igation on the occurrence of dark fibres in the Suffolk fleece was begun in the spring of 1925 and has aroused considerable interest among breeders who recognise the importance of the problem of the elimination

of these fibres. Observations were made on the changes in colouration of the lamb's coat as growth proceeded, a colorimetric scale being devised for standardising the records which were taken at regular intervals. At first only a few lambs in two pedigree Suffolk flocks were observed but useful indications for further development were obtained. It was found that definite correlations existed between age and head and body colours and also between the rate of change of the head to a uniform dark colour, and the rate of change of body to a uniform light colour. The lambs were graded according to freedom from dark fibres in the lower thigh region when the body colour ceased changing and a significant correlation was found between the body colour at 80-120 days and this grade. These observations indicate the possibility of selection against dark fibres on the basis of rate of change of colour and the colour at a definite age period before maturity is reached. Fleece samples from the lambs and their sires and dams were taken and have been analysed, the proportions of kemp fibres and tipped wool fibres by number and weight per unit weight of fleece being determined; there was no correlation between the numbers or weights of the two types of dark fibres but a significant correlation between the proportions by weight of dark kemp fibres in the dams and in the lambs probably exists.

Studies on the Fleece of Blackface Sheep. A number of observations on the types of lambs' coats existing in pure Blackface flocks in different districts were made with a view to developing a scheme similar to that used in the Welsh Mountain breed. While the same general types of coat could be distinguished in the lamb, and a number of sheep were traced to the age of maturity, it is manifest that full development of the scheme must be delayed until satisfactory systems of marking for identification and analysis and classification of mature fleeces are determined.

The Introduction of Corriedale Sheep and of Merinos from South Africa. The private breeders who are experimenting with Corriedale sheep and Merinos, recently introduced to this country from New Zealand and South Africa respectively, have kindly consented to allow observations to be made on these sheep and their crosses, and full advantage is being taken of this opportunity of studying the response and development of sheep under new conditions of habitat and management.

Wool Measurements. In co-operation with Mr. J. A. F. Roberts the determination of standards of wool and fleece measurements is being followed with the immediate aim of satisfactory survey and analysis of the fleeces of the Border Leicester and Cheviot breeds and the Halfbred cross. It is hoped that when a standard system has been developed, it will be possible to make detailed surveys of various breeds and their crosses for the collection of data on the inheritance of fleece characters.

J. A. Fraser ROBERTS.

(1) Papers Published.

Research Work in Animal Breeding at the College Farm of the Uni-:versity College of North Wales, Bangor. II. Welsh Jour. Agric., 1926). During the past three or four years the Department has co-operated with the University College of North Wales on a series of experiments with sheep. The main experiment involves a study of the fleece of the Welsh sheep with a view to its improvement; this work has been described in previous annual reports. The pedigree and mountain flocks of the Col-:lege have been available and it is hoped this season to start actual breeding experiments with these sheep in order to test the possibility that some of the characteristics found to be important may be compar-:atively simple genetically.

An extensive series of experiments has been maintained in connec-:tion with the inheritance of colour in sheep. This work is referred to elsewhere. A study has been made of a congenital abnormality in lambs.

Piebald (Spanish) Sheep and their Crosses with Other Breeds. (Welsh Jour. Agric., 1926). Piebald sheep, of which many flocks are to be found in this country, when crossed to other breeds, give only self-blacks in the F_1 generation. Additional confirmation of this state-:ment has been obtained in the case of crosses with Southdown, Kerry Hill, Welsh Mountain, and Oxford Down sheep and a backcross to white is described. The result of the backcross was six whites to five blacks which is good evidence that Piebald sheep possess a dominant black factor. The hypothesis is advanced that the spotting depends upon a recessive pattern factor acting on a coloured animal.

The Cotted Fleece. (Jour. Text. Instit., 1926). A fleece is term-:ed 'cotted' in the trade sense when it is closely matted together us-:ually not far from the skin; such a fleece is of considerably less value than a similar normal fleece. The matting is due to a shedding of part of the fibres composing the fleece. The terminal portions of such fibres are fine and become closely intertwined. In the case of the sheep studied the process occurs in winter and spring, the great majority of cases occurring during a limited period which is probably about February. Cotting does not occur twice in a single season in the same individual. There is a constitutional tendency towards cot-:ting which also occurs more frequently in older sheep. The proportion of cotted fleeces in a given flock varies considerably from season to season, but the period at which the process occurs does not. It is concluded that the partial shedding of the fleece is due to influences which act on sheep of varying individual susceptibility at a susceptible time and that these influences vary from year to year.

with F. A. E. CREW. The Genetics of the Sheep. (Bibliog. Genet., 1925). A review of what is known of the genetics of the sheep, some of the headings being pigmentation, fleece characters, horn growth, fertility, etc.

with T. J. JENKIN. A Preliminary Note on Reversed Badgerface Pattern in Sheep. (Welsh Jour. Agric., 1926). A pattern occurring in sheep to which the name badgerface has been given has already been described (Jour. Genet., 1924). Sheep possessing a pattern in which the black areas of the badgerface pattern are white and the white areas black have been discovered. This reversed pattern is much more uncommon than the badgerface pattern. A certain amount of evidence exists that the reversed pattern behaves as a simple recessive as contrasted with white.

(2) Work in Progress

Fleece Studies. Before observations can be made on fleece qualities, particularly in crosses between different breeds, it is essential that such qualities should be defined in terms of a series of standard measurements. Such a system is being worked out and an attempt at completeness is being made by taking into consideration the interconnection of the various factors involved, scientific, technical, and agricultural.

Colour Inheritance in Sheep. It is hoped that the work which has been planned out under this head will be practically completed by the end of the year. The study of colour has proved particularly fruitful in that the problems involved have been comparatively simple. It is not proposed, however, to continue indefinitely on these lines; a definite point has been reached at which it is profitable to use the sheep of the University College of North Wales for crossing experiments involving fleece qualities of economic importance.

A. D. Buchanan SMITH.

Work in Progress.

Pigs. With a view to finding out which of the problems of the pig breeder are amenable to genetical investigation, contact was made with officials of various societies and with leading pig breeders. These problems resolved themselves into two main types, those dealing with the actual conformation of the ideal type of pig, pork, or bacon, and those in which information was required regarding the mode of inheritance of specific characteristics, usually blemishes.

As regards the first type of problem, it is not necessary to emphasise the discrepancy at present existing between the ideals of the

practical breeder (as exemplified by showyard placings) and those of the bacon curer. With a view to correlating the two, it was felt that some system of Advanced Registry in pigs along the lines already in use both in Denmark and the United States should be adopted in this count-:ry. It was, however, felt to be unwise to adopt this straightaway without some preliminary analysis of the situation. Accordingly, af-:ter observation of the anomalous results of the bacon competition at the Highland Show as conducted by the Scottish National Association of Pig Breeders, arrangements were made with the directors of the Stir-:ling Bacon Factory by which we have been granted facilities for the examination of carcases. It is recognised that feeding affects large-:ly the type of carcase and if such tests are to be of any use from a genetical point of view, the pigs examined must be uniformly fed. Ac-:cordingly, arrangements were made with the Prison Commissioners for Scotland whereby pigs provided by this Department would be raised at Barlinnie Prison near Glasgow. Unfortunately, money for this scheme was not immediately forthcoming and it had to be delayed till the sub-:sequent financial year.

It is intended to study carefully the various conformations of the pigs at the Prison, to keep a note of the rate of live weight increase in proportion to food consumption, and to correlate these facts with the quality of the carcase when the animals are killed at Stirling. Prolificacy will be taken into account as well as maturity and qual-:ity. Should this scheme bear fruit, it is proposed at a future date to apply it in the same way to pork production and finally to see if it is possible to combine the two in a dual purpose pig for it must be recognised that, in view of the fluctuations of the pork market es-:pecially, the average breeder wishes to be able to market his produce in either market and to do so by making only minor alterations in the diet and duration of feeding and not in the type or breed of his pigs.

As to the other type of problems, those relating to the manner of inheritance of specific characters, it was decided to co-operate with the Large Black Pig Society, as to the mode of inheritance of 'seedy-cut'. Seedy-cut occurs in white pigs, but in these it does not constitute so great a blemish as in black breeds (although on this ac-:count several white pig carcases were heavily scored against at the National Dairy Show in 1925). In black breeds it is called 'black belly', and leading bacon curers assert that this blemish causes an annual loss of many thousands of pounds. In view of the facts that 'black belly' is by no means universal in black pigs and that certain strains are more liable to this trouble than others, it was considered that this was probably an inherited character.

The Large Black Pig Society generously offered to provide the necessary material for this investigation. This offer, however, could not be immediately accepted as there was no accommodation available and the matter had to be deferred. Mr. MacQueen Douglas, however, has

presented the Department with an excellent boar, nine months old, and of good pedigree. Until accommodation can be obtained, and pending the arrival of Large black gilts from the Large Black Pig Society, the boar has been sent to Barlinnie where he is being used on some crossbreeding work, the results of which are being analysed. Amongst other specific problems are such 'fancy ones' as the inheritance of 'rose', the precise effect on the carcase of killing gilts and sows when they are in the heat period. Studies in progress at a private herd show that there is considerable variation in the genetic constitution of the white colour in the various white breeds. With the co-operation of various breeders, studies were commenced last October by Mr. A. Calder concerning prolificacy and the sex-ratio.

Horses. In addition to an investigation regarding sterility in horses, work is in hand which it is hoped will be completed shortly, dealing with the Clydesdale breed. The construction of this breed is being studied by Mr. A. Calder, who is using as a basis Sewall Wright's coefficient of inbreeding which acts as a measure of homozygosity (i.e., purity of strain). Over a thousand pedigrees have been traced and analysed. It is somewhat early to formulate the results, but it appears as though the methods adopted successfully by the early breeders differed considerably from those of the founders of the cattle breeds. Comparatively little inbreeding was resorted to at the foundation of the Clydesdale. Since that date, there have been distinct 'waves' of inbreeding, each of which can be traced to the influence of some particular sire. As it is improbable that certain of the early breeders did not attempt to inbreed intensively (indeed, there is evidence that they did), an explanation must be furnished as to why this practice should be so successful in one class of animals and fail in another. Mr. Calder is also enquiring into the sex-ratio and allied phenomena in the Clydesdale.

Cattle. The task of collecting data on the mode of inheritance of coat colour in cattle is still in progress. As regards Shorthorn colours, the manner of inheritance of red roan is being studied in three herds. By the kindness of Mr. Hobson, Secretary, and also of several of the members of the British Friesian Society, some interesting data regarding the inheritance of dun colour has been obtained. It is not, however, proposed to published these results till a more complete study embracing especially the dun cattle of the Galloway breed, has been concluded. For this purpose, through the kindness of the Secretary, arrangements have been made whereby access is to be had to the herds of certain members of the Dun and Belted Galloway Association.

Goats. For reasons of economy and space there was no opportunity at the Department for studying the inheritance of milk yield in dairy cattle. It was, however, thought possible to make this study on a small scale by substituting goats for cows. Through the kindness of members of the British Goat Society, over forty goats have been presented to

the Department. As they arrived just before the mating season it has been possible to test the stock in the shortest possible time. A system of rigid culling has been adopted, and those animals which have been kept form an excellent foundation for an experiment of this nature. At the same time as breeding for milk yield, it is intended to select for hardiness, as in this climate a good milking goat whose milk yield varies considerably with the weather is not to be so much desired as one whose yield is more stable.

There are other points being studied, such as the mode of inheritance of coat colour, white markings, horns, tassels, ear length and folded ears; while some of them are of importance, others appear distinctly trivial. It is nevertheless of great importance that the mode of inheritance of trivial characters in domestic stock should be traced as, when economic ones are investigated, there is always a chance of obtaining some definite correlation between the two, thereby making selection an easier matter.

Another class of goat problems relate rather to animal breeding in its wider sense. Amongst these are problems as to why certain goatlings which have never been mated produce milk and whether this is an hereditary tendency; as to the significance of hermaphroditism; as to the advisability of goatlings having kids; and also as to the economic length of a lactation period. Another problem that is possibly genetical relates as to why the milk of certain goats fails to keep as well as that of others. Lastly, some attempt is to be made to seek a solution to the problem of making does come on heat during the late spring and summer months in order to ensure a regular supply of milk throughout the year, and thereby make goats' milk an economic proposition to the retailer.

The help received from the officials and members of the British Goat Society must be recorded as well as their gifts, for many have not hesitated to give the fullest information regarding certain points. The names of those who presented animals to the Department will be found on page 7.

Sterility. That an animal should be fecund is the foundation fact of animal breeding. Unfortunately, owing to intensive selection for other points, fecundity has not always been eagerly sought by the general breeder. In many breeds this negligence has led to heavy individual losses and many of the best races or families in certain breeds are with difficulty procreating themselves. It is recognised that there are several forms of sterility. Most can be comparatively easily overcome or avoided by the veterinarian or the expert feeder while others are genetical in origin and these are the ones which mostly affect the best families of certain breeds. While certain temporary palliatives can be - and not infrequently are - adopted whereby an animal may produce an occasional offspring, this only increases the

trouble at a later generation. Accordingly, the situation as it is developing in certain breeds is under observation. In horses studies are being conducted which lead to a strong supposition that the mode of inheritance of a certain form of sterility is not very complicated. It is, however, difficult to obtain sufficiently reliable data with which to check these observations and the work during the present year and for several years to come must be distinctly slow. Owing to the kind co-operation of breeders, several stallions were examined during the year, and the observations then made form the basis of some exper-:imental work during the coming year.

In cattle, "white heifer disease" which is due to an imperforate hymen and is not necessarily restricted to white heifers only, came under observation. It would appear that there are several degrees of this trouble and that in certain cases the hymen may be successfully perforated. Some evidence has been adduced which gives us reason to believe that there is an hereditary tendency to this disease.

In pigs it is prolificacy rather than sterility that is being studied. With the help of the Rowett Research Institute and Asylums as well as private breeders, records are being procured showing litter size, etc.

Most of the work relating to pigs, goats, cattle, and horses, has only been inaugurated during the year under review, and it is manifest-:ly impossible to expect that the results of breeding observations and experiment amongst the slowly breeding animals can be obtained in a short period of time. The work under review is rather a statement of the foundation of the work which is being undertaken with a view to more conclusive results being obtained several years hence.

In this connection, it must be noted that the increased amount of land which the University has put at the disposal of the Department and the grant of money which the Board has furnished for the equipment of this land give better facilities for the carrying out of some of this work, and these are likely to be increased by a further grant from the Board for the erection of adequate pig and goat accommodation.

Y. TAMURA.

(1) Papers published.

Sterility in a Dog × Dingo Cross. (Veter. Jour., 1926). (cf. Fifth Annual Report).

(2) Work in Progress.

A Study of the Anovular Follicle in the Ovary of Sterile and In-:fecund Animals. (in the Press). In the ovary of sterile dingo

bitches and of mice during pregnancy anovular follicles as described by League and Hartman were found. In the case of the sterile dingoes the results of this study agree in certain details with the conclusions of League and Hartman while in others they are found to disagree. The condition found suggests that these anovular follicles had resulted from absorption of their ova and preservation of membrana granulosa. In the experience of the present writer these follicles are more frequently found in old, sterile, or pregnant individuals, and it is suggested that their development is determined by nutritional agencies.

Structural Changes in the Suprarenal of the Mouse during Pregnancy. The suprarenal gland in the mouse was examined at all stages of pregnancy and the following results were obtained. Hypertrophy of the zona glomerulosa occurs during pregnancy and at the time when the foetus is 17 mm. in length it reaches its maximal secretory activity. Observations on the hypertrophy of the zona fasciculata are in agreement with those of other workers (Guieysse, et alia). This hypertrophy may be caused by either an enlargement of cells or an increase in their number. In the latter case it is due to the appearance of a new zone, zona gestata. This zone reaches its maximal activity at about 17 mm. and at this stage the so-called siderophile bodies (secretory granules) are visible in great numbers. Zona reticularis degenerates rapidly at an early period of pregnancy (before the formation of the placenta). The hypertrophy of the medulla occurs at the closing period of pregnancy; the secretory activity of this gland increases slowly and reaches its maximum at about the third quarter of pregnancy, followed by a partial decrease during the last quarter.

with K. Masui. Effect of Gonadectomy upon the Weight of the Kidney, Thymus, and Spleen of Mice. In order to obtain conclusive results, a large number of experimental animals (six hundred) was used so that the data could be analysed statistically. It was found that normally the male is considerably heavier than the female. As the result of gonadectomy in the male there occurs no change in the body weight while in the female it increases rapidly after spaying. The female is longer than the male and the body length increases slightly after castration, while spaying produces no effect.

The kidney of the male is strikingly heavier than is that of the female (75 per cent.). The kidney of the castrated male becomes greatly reduced in weight and approaches that of the female kidney; in the spayed female only a slight reduction in the weight of the kidney may be observed. The thymus of the female is considerably heavier than that of the male. Castration is followed by a striking increase in weight which approaches that of the female thymus: spaying has but little effect. The spleen of the female is heavier than that of the male and the results of castration and of spaying are the same as in the case of the thymus. The results of the present study do not agree with Lipschutz's hypothesis of the 'asexual' type, for gonadectomy

is followed by a development of the characters typical of the opposite sex.

with F. A. E. Crew. On the Effects of Vasectomy and of epididymo-deferentectomy in the Mouse. Mice were vasectomised or epididymo-deferentectomised, and at 70–200 days after operation the testes were examined. It was found that degeneration of the germinal epithelium of the testis invariably follows the operation of vasoligation or of vasectomy in the mouse, but this does not become exhibited until a con-:siderable period of time has elapsed. Similar degeneration follows the operation of epididymo-deferentectomy, but after a much shorter interval of time. This degeneration is caused possibly by the press-:ure within the seminiferous tubules exerted by the accumulation of seminal products or more probably by the action of toxic substances liberated from the disintegrating cells and sperm debris.

LIST OF PUBLICATIONS, 1925-1926.

Books.

CREW, F. A. E., Animal Genetics: An Introduction to the Science of Animal Breeding. 420 pp. Oliver & Boyd, 1925.

CATTLE BREEDING. Proceedings of the Scottish Cattle Breeding Conference. 495 pp. Oliver & Boyd, 1925.

Papers.

BLYTH, J. S. S.,

Studies on the Fleece Fibres of British Breeds of Sheep. Thesis, Edinburgh, 1925.

CREW, F. A. E.,

Genetics in Relation to Livestock Breeding. Trans. High. & Agric. Soc., 146-166, 1925.

Sexuality and Intersexuality. Public. No. 14, Brit. Soc. Study Sex Psychol., 23 pp., 1925.

Unilateral Vasoligation on the Senile Male of the Domestic Fowl. Proc. Roy. Soc. Edinb., v. 45, pp. 249-251, 1925.

Rejuvenation of the Aged Fowl through Thyroid Medication. Ibid., pp. 252-260, 1925.

Prenatal Death in the Pig and its Effect upon the Sex-ratio., Ibid., v. 46, pp.10-14, 1925.

and ASDELL, S. A., The Inheritance of Horns in the Goat. Jour. Genet., v. 15, pp. 367-374, 1925.

FINLAY, G. F.,

Studies on Sex-Differentiation in Fowls. Brit. Jour. Exp. Biol., v. 2, pp. 439-468, 1925.

GREENWOOD, A. W.,

Gonad Grafts in the Fowl. Brit. Jour. Exp. Biol., v. 2, pp. 469-492, 1925.

and CREW, F. A. E., Henny-Feathering in an Ovariotomised Hen with Active Testis Grafts. Proc. Roy. Soc, B., v. 99, pp. 233-241, 1926.

THE LIBRARY
JAN 5 1927
UNIVERSITY OF ILLINOIS

NICHOLS, J. E.,

Segregation in Halfbred Sheep. Jour. Hered., v. 16, pp. 401-408, /1925.

ROBERTS, J. A. Fraser,

Research Work in Animal Breeding at the College Farm, Bangor. II. /Welsh Jour. Agric., v. 2, 1926.

Piebald (Spanish) Sheep and their Crosses with Other Breeds. Ibid.

The Cotted Fleece. Jour. Text. Inst., v. 17, pp. 3-11, 1926.

and CREW, F. A. E., The Genetics of the Sheep. Bibliog. Genet., v. /2, 1925.

and JENKIN, T. J., A Preliminary Note on Reversed Badger-face /Pattern in Sheep, Welsh Jour. Agric., v. 2, 1926.

TAMURA, Y.,

Sterility in a Dog × Dingo Cross. Veter. Jour. v. 82, 1926.

Articles.

CREW, F. A. E.,

Sex-Determination. Nature, v. 115, pp. 574-577, 1925.

Sir William Bayliss. Biol. Gener., v. 1, pp. 163-166, 1925.

SMITH, A. D. Buchanan,

Horse Pulling Contests. Agric. Gaz., April, 1926.
Pedigree and Performance. Brit. Berks. Ann., 1926.
Problems of Porcine Inheritance. Large Black Pig Soc. Breed /Ann., 1925.
Shorthorn Sires in America. Shorthorn Breeders' Guide, 1926.
Prominent British Sires - Yesterday and To-day. Shorthorn World, /Dec., 1925.
Breed Purity and the Position of the Aberdeen-Angus. Aberdeen- /Angus Jour. Amer., Dec., 1925.
The Need for Careful Selection and Mating of Pigs from the Genet- /:ical Point of View. Pig. Breed. Ann., 1926.
Some Genetical Aspects of Sterility in Cattle. Hereford Breed. /Ann. and Guide, 1926.
Research in Goat Breeding. Brit. Goat Soc. Year Book, 1926.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 129253446